

Variation in sediment nutrient concentrations in an urban-mangrove ecosystem, Piñones, Puerto Rico

J. Rivera¹, D. Ogurcak¹, T.Crowl¹, J.Fourqurean¹, J.Kominoski¹, J.Meeder¹, M.Ross¹, T. Barreto², M.Santos², J. Smoak³, and A.Chappel³

¹Florida International University, ²Universidad de Puerto Rico, Rio Piedras, and ³University of South Florida

Goal

- Determine the variation in sediment nutrients and soil properties downcore at a basin forest dominated by red mangrove, *Rhizophora mangle*.
- Comparison of accretion rate and sea level rise (SLR) in north side of the Island

Site Description

- Located in East side of Puerto Rico, adjacent to the airport, built in the 1950's

Core (red mangrove)- distance to coast 223meters. Salinity=40.4ppt..



Figure 1. Location of core sample

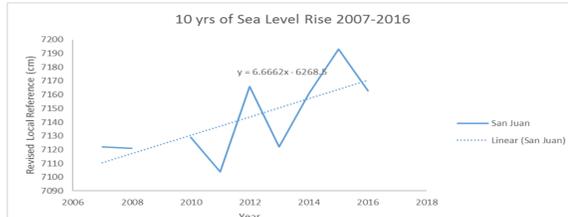


Figure 2. Tide gauge, 10 years of SLR in San Juan.

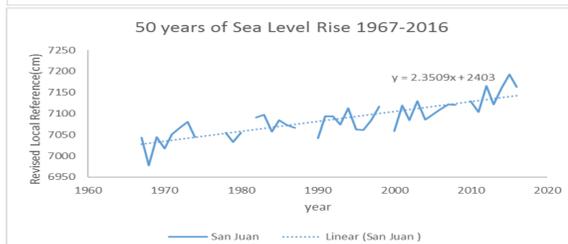


Figure 3. Tide gauge, 50 years of SLR in San Juan.

Research Methodology

- Collect mangrove peat in 50cm cores on the sites.
- Tests for loss on ignition (LOI) to estimate the percent of organic matter.
- The samples were analyzed for carbon, and nitrogen by a CHN analyzer.
- Colorimetric analysis was used for phosphorus analysis.
- Dry and weigh samples for dry bulk density (DBD).
- Model used was the constant rate of supply (CRS) for determine sediment accumulation rate using lead 210



Figure 4. The core is being processed (top left image), samples are being prepared in sub-samples and being homogenized (top right and bottom left images). Collecting core at the mangrove forest (bottom right image).



Results

- DBD changed over time. LOI decreased in 1993, based on inorganic influx and started increasing in the past ~ 5 to 14 years.
- Inorganic carbon was below detection, all inorganic sediments must be terrigenous and silicate based.
- The increase in nutrient of CNP is associated with OM.
- The rates of sediment accumulation has so far exceeded SLR in comparison with the increase of sea level rise of the past 50 years.
- In the last 10 years SLR rate has surpassed the sediments accretion rate.

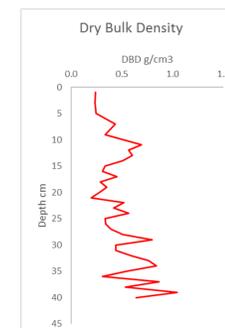


Figure 5. DBD throughout the depth of the core (left image).

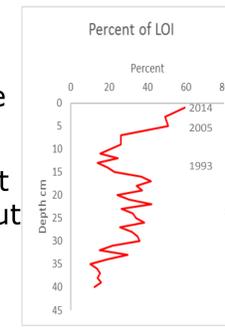


Figure 6. Percent of LOI throughout the depth of the cores (right image).

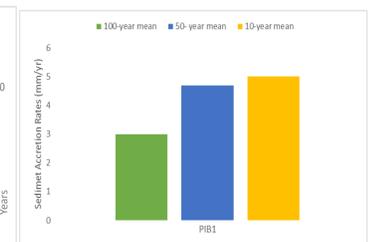


Figure 10. Sediments Accretion Rates for PIB1 (top image).

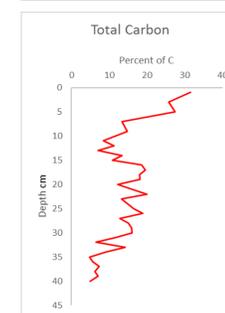


Figure 7. Total percent of carbon throughout the depth of the core.

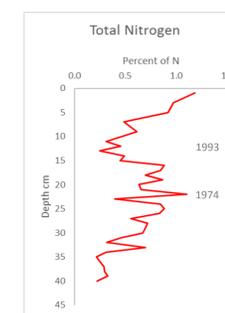


Figure 8. Total percent of nitrogen throughout the depth of the core.

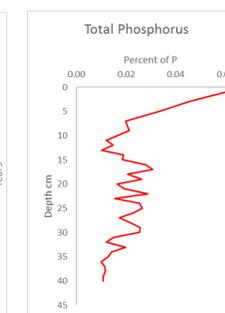


Figure 9. Total phosphorus throughout the depth of the cores.

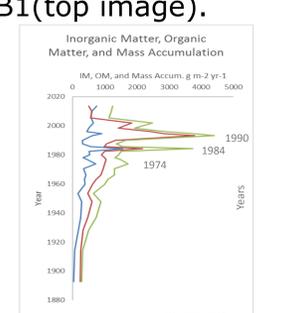


Figure 11. IM, OM and mass accumulation gm-2 y-1

